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Contents

Editorial

Healing in Times of Crisis
TM Srinivasan

Review Articles

A Systematic Review of Mindfulness Practices for Improving Outcomes in Chronic Low Back Pain
Stefanie L. Smith, Wendy Hoon Langen

Original Articles

Determinants of Maintaining a Daily Yoga Practice: Health Locus of Control and Self-determination Theory Perspective
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Determinants of Maintaining a Daily Yoga Practice: Health Locus of Control and Self-determination Theory Perspective

Abstract

Background: Despite the growing evidence of the health benefits of a yoga practice, little is known about the factors that contribute to its sustained practice. **Aims:** The objectives of the present study were twofold: (1) to describe the personal characteristics (age, education level, and marital status) and yoga asana-related behavior of participants who practice Ashtanga and (2) to examine the health locus of control (HLOC) (an individual's beliefs about the extent of control that they have over things that happen to them) and self-determination theories. (People are able to become self-determined when their needs for competence, connection, and autonomy are fulfilled in relation to the motivated behavior.) **Methods:** Ashtanga yoga practitioners ($n = 100$, age range: 20–62 years) reported practicing yoga at least once a week completed self-report questionnaires: demographics, asana practice, the Perceived Choice and Awareness of Self Scale, HLOC, the General Health Questionnaire-12, the Perceived Stress Scale, and the State-Trait Anxiety Inventory. **Results:** It was observed that participants practiced yoga for an average 6.43 years, 5 days a week for 93 min representing a sustained, motivated health-related behavior. Years of practice and percentage of time spent in home practice explain 9% of the variance in the awareness of self, and 7% is explained by the number of practice days a week and state anxiety. Ashtanga yoga practitioners have a high internal HLOC; this is related to reduced trait anxiety and increased perceived choice. **Conclusions:** The Mysore system of yoga appears to facilitate sustained health-related behavior; it is suggested that health promotion should acknowledge the three aspects of self-determination theory: competence, autonomy, and relatedness, while focusing on the increasing intrinsic motivation and internalizing HLOC.

Keywords: Ashtanga yoga, health locus of control, self-determination

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Introduction

There is emerging evidence from randomized trials to support popular beliefs about yoga for depression, sleep disorders, and as an augmentation therapy.^[1] Randomized trials have also given support to the physical benefits of yoga^[2] and benefits to patients with both physical and psychological components.^[3]

A systematic review of theoretical explanations for maintenance of behavior change found that many behavioral theories do not explicitly address the issue of behavioral maintenance. Concluding behavior change interventions are effective in supporting individuals in achieving temporary behavior change, however, behavior change maintenance is rarely attained.^[4] The focus of research into yoga has been on the improvements to health

after a brief prescribed intervention of generally 4–6 weeks.^[5–7] There is a need to investigate what factors impact the sustained practice of yoga over time.

Self-determination theory (SDT)^[8–10] differentiates the content of goals or outcomes and the regulatory processes through which the outcomes are pursued, critically goal pursuit, and attainment concerns the degree to which people can satisfy three innate psychological needs: competence, autonomy, and relatedness. SDT suggests a continuum of motivation in which autonomous and controlled motivations comprise factors of extrinsic and intrinsic motivation (from most self-determined to least self-determined they are: intrinsic motivation, self-determined motivation, nonself-determined extrinsic motivation, and amotivation). The natural processes of intrinsic motivation, integration

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of extrinsic regulation, and progression toward well-being operate optimally when the support for experiencing competency, relatedness, and autonomy is immediately present.

Ashtanga is a physically challenging style of yoga, which requires self-discipline and repeated practice.^[11,12] A comprehensive review of yoga and its ability to increase the quality of life concluded that no guidelines exist regarding the frequency of practice, suggesting the more difficult yoga is for someone in the beginning the more their body needs yoga subsequently individuals should practice as often as possible, especially in the beginning the more you practice the more you benefit.^[13] In contrast, the Ashtanga system suggests practicing 6 days a week. The practice of Ashtanga yoga asana, one of the eight limbs outlined in Patanjali Yoga Sutras,^[14] addresses the three innate psychological needs defined by SDT. Competence in one asana is required before progressing to the next within this self-regulated, autonomous, practice. This practice can be a solitary practice where a teacher uses physical adjustments within a room of other practitioners, and thus relatedness is experienced. Events which support autonomy and competence facilitate an internal locus of causality and competence, leading to an increase in intrinsic motivation as reflected, for example, by the behavior that persists with a minimum of external support.^[8]

Ashtanga yoga practitioners often modify their lifestyle to include healthier behaviors such as smoke cessation, reduced alcohol consumption, and preference for organic and vegetable-based food,^[15] suggesting a belief they have control over their own health a determinant of health behavior.^[16,17] The health locus of control (HLOC) as a generalized expectancy can be thought of as predicting health behavior, the beliefs that powerful others influences one's health PHLOC almost never correlate significantly with health behaviors and the beliefs that fate, lack of luck, chance HLOC (CHLC) are indicators of a lack of perceived control or possibly an external locus of control. The complexity of factors involved in maintaining a healthy behavior is theorized as a multiplicative function of internal HLOC (IHLC) and the individuals' value on health; thus, health value is a moderator of the relationship between IHLC belief and health behaviors. An internal health control orientation is a necessary but not a sufficient condition for engaging in health behavior, and there must be a belief that health status is dependent on the health behavior and motivation from valuing the reinforcement good health would bring.^[17]

Investigation of practitioners who maintain a practice reveals that yoga use is related to sociodemographic factors, male, younger, anxious people with low internal locus of control and these practitioners are less intrinsically motivated to start yoga.^[18] Yoga practitioners are more emotionally stable in terms of state and trait anxiety with

enhanced tolerance to perceived stressful day-to-day events.^[19]

The purpose of the present study was to examine the locus of control of Ashtanga yoga practitioners and to determine if their behaviors can be explained by SDT and assess the physical well-being in terms of the body mass index (BMI) and mental well-being in terms of general health, stress, and anxiety.

Methods

Participants and sampling procedure

The study was approved by the Ulster University Ethics Committee. Power analysis based on multiple linear regression according to the standards recommended by Cohen^[20] suggested a sample of 114, in order to detect a medium effect size at an alpha level of 0.05 with 80% power. Participants were recruited after their practice with a certified teacher in Mysore, India ($n = 66$), Carlingford, Ireland ($n = 23$), and Rotterdam, Holland ($n = 9$). Participants recruited in India were staying for a minimum of 1 month or maximum of 2 months as per the rules of practicing at the Shala. Participants recruited in Ireland and Holland had a minimum of 2 weeks and maximum of 4 weeks, and many were practicing in their place of residence with a visiting teacher. Participants were required to have a good understanding of written English (fully understand the information sheet and the questionnaires) and practice Ashtanga at least 1 day a week.

Due to incomplete questionnaires and missing sections, a sample of 100 were analyzed.

Materials

Demographics, age gender, education, and ethnicity information were recorded. Yoga practice was assessed in relation to years, days per week, length of time, and place of practice. BMI was calculated from height and weight.

The Self-Determination Scale

Perceived Choice and Awareness of Self Scale (PCASS)^[21] was designed to assess the individual differences in the extent to which people tend to function in a self-determined way. It is thus considered a relatively enduring aspect of people's personalities which reflects (1) being more aware of their feelings and their sense of self and (2) feeling a sense of choice with respect to their behavior. The PCASS is a short, 10-item scale, with two 5-item subscales. For each item, participants indicate which of two statements feels most true for them (e.g., "A. I sometimes feel that it's not really me choosing the things I do" or B "I always feel like I choose the things I do." Using a 1 (only A feels true) to 9 (only B feels true) scale. The measure has been shown to have good reliability and validity.^[22]

In relation to Ashtanga yoga, competence in SDT can be measured by the length of practice; typically once one

posture is performed with ease, the student is given the next posture in the sequence. Autonomy and relatedness in SDT are evidenced in the self regulated practice where each practitioner goes through a sequence of postures at their own rate in a community where a teacher holds a space.

Health locus of control

The application of the locus of control construct in relation to health behaviors has become known as HLOC.^[23] The “locus of control” is a continuous scale which, at one end, has those who attribute success and failure to things they have control over “internal” and, at the other end of the scale, those who consider their success or failure is due to forces outside of their influence “external” either powerful others or chance. Form B is a “general” HLOC scale and contains three 6-item subscales: internality; powerful others externality; and chance externality. The items are rated on a six-point scale from strongly disagree to strongly agree, and the scores for each subscale are in the range 6–36. The internal reliability is in the range of 0.83–0.86.^[24]

General Health Questionnaire

The General Health Questionnaire (GHQ-12) consists of 12 items, each assessing the severity of a mental problem over the past few weeks using a four-point scale (from 0 to 3). The Cronbach’s alpha shows good internal consistency ($\alpha = 0.94$).^[25]

Perceived Stress Scale

The Perceived Stress Scale (PSS)^[26] is a measure of the degree to which situations in one’s life are appraised as stressful. The questions are relatively free of content specific to any subpopulation group. Respondents are asked how often they felt a certain way during the last month. It is a 14-item questionnaire with responses ranging from 0 never to 4 very often. The alpha level is 0.84, 0.85.^[26]

State-Trait Anxiety Inventory

The State-Trait Anxiety Inventory^[27] is a widely used self-report scale that assesses the current and individual proneness to anxiety. It comprises 20 items assessing trait anxiety (relatively stable) and 20 for state anxiety (prone to fluctuations). State anxiety items include: “I am tense; I am worried” and “I feel calm; I feel secure.” Trait anxiety items include: “I worry too much over something that really doesn’t matter” and “I am content; I am a steady person.” All items are rated on a four-point scale (e.g., from “almost never” to “almost always”). Internal consistency coefficients for the scale have ranged from 0.86 to 0.95.^[27]

Procedure

The study was conducted in Mysore, India, which is the source of the Mysore method, and in Carlingford, Ireland and Rotterdam, Holland, with one of the 31 teachers certified at the source to teach the method. Data collection

occurred during March in Mysore, May in Ireland, and August in Holland. Participants were verbally given a brief background description of what is involved in the study, the duration of the study, and why the research is being carried out. Participants were informed that it is voluntary and that they can withdraw from the study up to the point when their signed consent is detached from their completed questionnaires. Participants were informed that they were to complete the questionnaires after their yoga practice either while the researcher was present, so any further questions could be addressed, or completed alone and returned in the envelope provided. The response rate was 38%, and exclusion of three completed questionnaires due to incomplete response and not reaching the inclusion criteria resulted in a sample of 100.

Analyses were conducted in SPSS version 22 (IBM SPSS Inc., Chicago, IL, USA). First, the normality and the reliability of the variables of interest were investigated. The sample was divided into two different groups on the basis of their HLOC scores. After grouping the participants, *t*-tests were used for group comparisons, Spearman’s rank-order correlation was used to assess the association between the variables, and linear multiple regression was performed to investigate the associations of the predictor variables and self-determination.

Results Demographics

Of the 100 participants who took part in the study, 68% were female. The mean age was 37.02 years (standard deviation [SD] 9.54 years), and 84% were university graduates with 47% at a postgraduate level [Table 1]. The majority of the sample were Caucasian 73%, and 51% were single. The location of data collection in India, Ireland, and Holland failed to reveal any significant differences except the expected for perceived choice subscale of the

Table 1: The demographics of the sample

Variable	Mean/percentage
Age (years)	
Mean (SD)	37.02 (9.54)
Range	20-62
Gender (% women)	68
Education (>1 year of college)	84
Marital status (%)	
Married	26
Single	51
Cohabiting	20
Divorced	2
Ethnicity (%)	
Caucasian	73
Hispanic	7
Asian	5
African-American	1
Other	14

SD=Standard deviation

self-determination scale (due to 66% having a choice to travel to India for 1 or 2 months); thus, all the data were combined for subsequent analysis.

Yoga practice

Participants were practicing Ashtanga yoga for a mean of 6.43 (SD: 4.9) years, ranging from 2 to 22 years. On average, participants practiced 5 days a week (SD: 1.1 days) for 93 min (SD 23.29 min). These factors were all positively correlated [Table 2]. With increasing years of yoga practice, there is an increase in days of practice per week ($n = 99$, $r = 0.233$, $P < 0.05$), length of practice ($n = 99$, $r = 0.243$, $P < 0.05$), and percentage of time spent in home practice ($n = 99$, $r = 0.278$, $P < 0.05$). Length of practice was also related to days of practice ($n = 99$, $r = 0.297$, $P < 0.01$). Increase in days of practice was related to a decrease in time spent in a Led (teacher leads the class by calling out the postures of the sequence) class ($n = 99$, $r = -0.339$, $P < 0.01$).

The location of practice revealed that 26% of the participants in the sample practice at home, 41% in a Shala and 33% in a mix of home and Shala. The percentage of practice time in each location revealed that two people reported they did not practice Ashtanga at home and 6 people practiced 100% of the time at home. It was observed that 45% of the sample reported that between 50% and 100% of their practice took place in a home setting.

Health status

In the present sample, 78% were considered a healthy weight according to the BMI ~ (mean 21.59 (SD 3.02; range: 16.79–33.96), 10% were underweight, and 11% were overweight.

It was observed that 80% of the sample had a GHQ score under 11, indicating no psychological distress. GHQ was not related to years of practice, length of practice, nor number of days; however, there was a positive relationship between GHQ and percentage of time in home practice ($n = 75$, $r = 0.289$, $P = 0.012$), and conversely, there was a negative relationship between GHQ and percentage of time in Mysore room ($n = 75$, $r = -0.318$, $P = 0.001$).

Health locus of control

Table 3 presents the normative HLOC data combining various samples from chronic patients to persons engaged

in preventive health behavior.^[22] As Ashtanga yoga practitioners are motivated in pursuing a health-related behavior, the cutoff points from the large sample of persons engaged in preventive behavior were used to compare high low IHLC, CHLC, and powerful others HLOC. This was a preferable method as the present sample size is small and median splits based on such data would provide less appropriate cutoff points than means or medians from large samples.

The Ashtanga practitioners have the highest IHLC the lowest powerful others HLOC and a CHLC score similar to the population of healthy adults. The impact of being above or below the mean cutoff score determined from normative data on the three dimensions of HLOC was investigated in terms of stress, anxiety, and self-determination.

Participants low in the dimension internal health locus revealed significantly higher trait anxiety $t = 2.295$ (87), $P = 0.024$, and significantly $t = -2.213$ (98), $P = 0.029$, lower score on the choice dimension in the self-determination scale. In relation to the choice dimension of the HLOC, high choice participants had higher state anxiety -2.246 (88.114), $P = 0.027$, higher trait anxiety, $t = -2.178$ (87), $P = 0.032$, and higher stress, $t = -3.305$ (87.214), $P = 0.001$ [Table 4].

Participants low in the dimension powerful others had significantly lower state anxiety than participants high on the powerful others dimension $t = -2.24$ (97), $P = 0.027$.

Stress

Nearly 85.7% of the sample scored under 26 indicating low-to-moderate perceived stress as measured by PSS. Stress was not correlated with any practice variables, $P > 0.05$.

Self-determination

The relationship between the years of practicing Ashtanga and SDS awareness of self, approached significance $r = 0.190$ ($n = 99$), $P = 0.059$.

Linear regression revealed that awareness of self has 9% variance explained by percentage of home practice and years of Ashtanga practice. Seven percent of the variance in awareness of self is explained by the number of days of a week and state anxiety.

Table 2: The correlation of yoga practice measures

	1	2	3	4	5
Years of Ashtanga					
Number of days of practice	0.233*				
Length of practice	0.243*	0.297**			
Percentage time home practice	0.278*	0.129	-0.126		
Percentage time led class	-0.086	-0.339**	-0.148	-0.324*	
Percentage time Mysore	-0.150	-0.194	0.270*	-0.818*	0.294*

* $P < 0.05$, ** $P < 0.01$ $n = 99$

Discussion

In line with previous research,^[18,28] the present sample included mostly female, highly educated, employed, and white. They had low stress levels, and the majority were healthy with good general mental health.

Ashtanga yoga practitioners are motivated to practice on average 5 days a week, and almost half of the participants in the sample have reported that between 50% and 100% of their practice took place in a home setting; it is suggested that this self-motivated behavior is related to intrinsic motivation. The general health quotient increased with increasing time spent in home practice and decreased with time spent in a Mysore room. Suggesting there may be a trade-off between autonomy and relatedness, the general mental health increases when there is the option, choice, possibly due to geographical location of a Shala offering a Mysore class, to practice with a teacher. Some practitioners may not have daily access to a Mysore class thus the need to travel to India to practice at the source and/or attend classes with visiting teachers who have been authorised in Mysore to teach the method. Maintaining the factor of relatedness should be encouraged as a means of maintaining good mental health, and it may be the social aspect after class that ensures the GHQ is lower. This is related to the conclusion that intrinsic motivation alone is unlikely to sustain long-term regular engagement.^[29] Sustaining a physically active lifestyle presumably requires a high degree of effort, often for mundane or repetitive

activities, regulation by identification with the outcomes may be more important than exercising to challenge oneself.^[30] Behavioral domains that require engagement, internalization of the value of the outcomes is likely to lead to greater persistence than being intrinsically motivated.

The behavior of practicing Ashtanga for an average of 93 min, 5 days a week for an average of 6.43 years represents a sustained health-related behavior and years of practice and percentage of time spent in home practice explains 9% of awareness of self-SDT and 7% is explained by number of practice days a week and state anxiety. The variance explained is low; however, the findings support the conclusion that developing autonomous self-regulation and increased autonomous motivation is important to sustain behavior.^[31]

As stated, the variance explained is low and suggests that in conjunction with self-determination, there is another aspect of health that contributes to the maintenance of this demanding behavior. Ashtanga yoga practitioners have, as expected, a high IHLC higher than a sample of people engaged in preventative health behaviors.^[24] This is related to reduced trait anxiety and increased perceived choice. This offers some support to the findings that internality is significantly negatively correlated with both depression and debilitating anxiety.^[32] Further supported by the results from the two external factors, only 16% of the present sample reported a high score on powerful others (beliefs that health outcomes are related to powerful others such as doctors). These respondents had higher state anxiety compared to the sample with a low powerful others HLOC. The other external factor, chance (belief that health outcomes are related to chance fate) revealed that almost half the sample 49% scored low on the chance element of locus of control these participants had lower state anxiety and lower stress than the 51% who scored high on the chance measure. The sample reported low-to-moderate perceived stress levels and this is in line with the objective measures of stress.^[33]

The present study investigated people who had made a conscious choice to study Ashtanga yoga and may not be generalizable to the individuals who do not make a choice

Table 3: Mean scores for health locus of control scales summarized across types of subjects and the scores from Ashtanga yoga practitioners

	<i>n</i>	IHLC	CHLA	PHLC
Chronic patients	609	25.78	17.64	22.54
College students	749	26.68	16.72	17.87
Healthy adults	1287	26.55	16.21	19.16
Persons engaged in preventive health behavior's	720	27.38	15.52	18.44
Ashtanga yoga practitioners	100	29.87	16.26	14.15

HLC=Health locus of control, IHLC=Internal HLC, PHLC=Powerful others HLC, CHLA=Chance HLC

Table 4: Comparison of participants ranked high and low on the three measures of health locus of control

	IHLC, mean (SD)		<i>t</i> (significant)	Choice HLC, mean (SD)		<i>t</i> (significant)	PHLC, mean (SD)		<i>P</i> (significant)
	Low (N24)	High (N76)		Low (N49)	High (N51)		Low N84	High N16	
State anxiety	32.30 (7.75)	30.55 (8.87)	0.853	29.04 (6.86)	32.84 (9.75)	-2.24*	30.15 (8.5)	35.46 (8.08)	2.244*
Trait anxiety	40.62 (10.18)	35.05 (9.55)	2.29*	34.05 (10.05)	38.54 (9.41)	-2.17*	36.11 (10.21)	38.00 (8.10)	0.608
Choice SDS	18.21 (3.81)	20.05 (3.46)	2.21*	20.55 (3.03)	18.71 (3.94)	2.61**	19.77 (3.49)	18.75 (4.26)	1.03
Self-SDS	18.28 (4.88)	19.66 (3.27)	1.56	19.89 (3.38)	18.78 (4.02)	1.479	19.09 (3.76)	20.56 (3.48)	1.44
Stress	20.08 (7.37)	18.56 (6.57)	0.937	16.77 (5.32)	21.08 (7.40)	-3.31**	18.49 (6.57)	21.33 (7.55)	1.50

SD=Standard deviation, HLC=Health locus of control, IHLC=Internal HLC, PHLC=Powerful others HLC

to practice yoga. Ashtanga yoga was chosen because of its systemized, organized, and intelligent sequencing. Ashtanga teachers will have their style of teaching but they are teaching the same method, so wherever you go in the world, it will be more similar than not. Unlike some other forms of yoga, the sequence is committed to memory and can be practiced alone if there is no Ashtanga teacher geographically close.

The questionnaire design implies that we cannot infer causality which is another limitation. The sample is small and does not have a control group but realistically there is no group comparative that would have served as a reliable control.

Conclusions

The Mysore system of yoga appears to facilitate sustained health-related behavior; it is suggested that health promotion should acknowledge the three aspects of SDT: competence, autonomy, and relatedness, while focusing on increasing intrinsic motivation and internalizing HLOC. Promotion of health-related behaviors should focus on the characteristics of the Ashtanga yoga system, encouraging autonomy, relatedness, and competency in conjunction with internalization of health beliefs.

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Conflicts of interest

There are no conflicts of interest.

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